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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	"20040013695"	US-PGPUB; USPAT	OR	ON	2007/12/03 15:16
S2	2	wo-9843479\$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/12/03 14:26
S3	1	("20020026035").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/12/03 14:26
S4	1	"20040013695"	US-PGPUB; USPAT	OR	ON	2007/12/03 15:30
S5	1	"20050226894"	US-PGPUB; USPAT	OR	ON	2007/12/03 16:14
S6	104	vaccine and (carrier with antigen with coupl\$3 with conjugat\$3)	US-PGPUB; USPAT	OR	ON	2007/12/03 15:55
S7	18	vaccine with mimotope with carrier	US-PGPUB; USPAT	OR	ON	2007/12/03 15:56
S8	4	jensen-jarolim-erika\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:21
S9	9	scheiner-otto\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:14
S10	3	pehamberger-hubert\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:14
S11	4	zielinski-christoph\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:15
S12	8	breiteneder-heimo\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:15
S13	11	S8 S9 S10 S11 S12	US-PGPUB; USPAT	OR	ON	2007/12/03 16:15
S14	10	S13 and acid	US-PGPUB; USPAT	OR	ON	2007/12/03 16:15
S15	0	jarolim-jensen-erika\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:20
S16	5	jensen\$-erika\$.inv.	US-PGPUB; USPAT	OR	ON	2007/12/03 16:20
S17	12	S13 S16	US-PGPUB; USPAT	OR	ON	2007/12/03 16:21
S18	13	S17 S5	US-PGPUB; USPAT	OR	ON	2007/12/03 16:22

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Volume 109, Issue 6, Pages 1034-1035
(June 2002)

◀ previous 28 of 38 next ▶

Anaphylaxis to Russian Beluga caviar

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This is the first report of a case of Beluga caviar anaphylaxis. The dynamics of the clinical reaction in our patient pointed toward IgE-mediated food allergy, but caviar had not previously been described as an allergen. Only once had a report of caviar adverse reaction due to histamine intolerance after the intake of monoamine-oxidase inhibitors been published; that was some 30 years ago.¹

In this study, we aimed to determine whether the patient's reactions were due to caviar intolerance or caviar allergy.

The patient (a 51-year-old man) reported a history of adverse reactions exclusively after the ingestion of Russian Beluga caviar; no reactions were observed after the consumption of any other food, including fish and seafood. On 3 occasions, he had experienced local symptoms (angioedema of the oral and laryngeal mucosa) and systemic symptoms (wheezing, hypotension and gastric cramps) within minutes after consuming caviar.

Total serum IgE was determined to be 22.3 kU/L (CAP-FEIA System; Pharmacia & Upjohn, Uppsala, Sweden), and no specific IgE antibodies to any common allergens were found in the patient's serum through use of radioallergosorbent tests (CAP RAST; Pharmacia & Upjohn) or with standard skin prick testing (ALK, Hørsholm, Denmark); the patient appeared to be nonatopic and nonallergic to the tested substances. Thus, as we began our investigation, histamine intolerance seemed to be a possible causative factor for the patient's adverse reaction to caviar.

To determine the histamine contents in Beluga caviar, the supernatant of minced roe was tested in a histamine radioimmunoassay. The measured histamine content (52 mg/mL) was lower than the average range for histamine-containing foods, such as red wine (600 mg/mL) and Camembert cheese (300 mg/mL). Moreover, the enzymatic activity of the diamine oxidase determined in the patient's serum was inconspicuous (0.09 nKat/L; normal range, >0.07 nKat/L).

Beluga caviar, Sevruga caviar (derived from sturgeon), and "false" caviars from lumpsucker, salmon, and trout—ie, bony fish—were extracted and used as antigens in immunoblot analysis. The patient's serum revealed IgE binding to allergens at molecular masses of 30, 84, 100, and 118 kDa from sturgeon caviars. Thus far, these antigens remain unidentified, though it is tempting to speculate that the high-molecular-weight band (118 kDa) might correspond to vitellogenin.² Much less intense IgE binding to a 73-kDa band in lumpsucker and an 82-kDa band in trout and salmon caviars was observed. These immunoblot investigations demonstrate that the patient's

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serum indeed contained IgE specific to sturgeon roe, whereas a control serum showed no IgE reactivity (Fig 1).

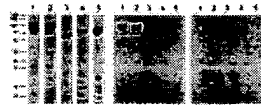


Fig. 1. Caviars of Beluga (1) , Sevruga (2) , lumpsucker (3) , trout (4) , and salmon (5) were extracted, and proteins were separated by sodium dodecylsulfate polyacrylamide gel electrophoresis. Coomassie staining revealed similar protein patterns in Beluga and Sevruga caviar, which differed from the patterns observed in "false" caviars (A) . Protein extracts of Beluga (1) , Sevruga (2) and the "false" caviars lumpsucker (3) , trout (4) , and salmon (5) were blotted to nitrocellulose and tested for IgE reactivity through use of serum from the patient (B) and serum from a nonallergic control individual (C) . Bound IgE was detected by I125-labeled antihuman IgE antibody. The autoradiogram is shown.

The clinical relevance of these observations was determined by skin testing. In skin prick tests involving the use of dialyzed protein extracts and prick-to-prick tests with raw fish roe, positive reactions exclusive to Beluga and Sevruga caviars could be observed, whereas results of pricks with "false caviars" remained negative.

The patient remembered having consumed Russian caviar a single time without any problems. But after a 2-year caviar-free interval he experienced 3 anaphylactic reactions, all elicited by Beluga. Thus, there was probably a single occasion for oral sensitization.

With respect to fish allergy, inhalative sensitization by airborne fish particles has also been described^{3, 4}; given our patient's life habits, however, this was unlikely. As is typical in fish allergy, our patient experienced the allergic reactions after long intervals of a caviar-free diet. It is, to date, not clear how specific IgE is maintained during periods of allergen absence, though it is well recognized that specific IgE survives longer in the mucosa bound to its high-affinity IgE receptor (Fc ϵ RI) than in the serum⁵; furthermore, it is known that monomeric IgE prolongs the half-life of mucosal mast cells.⁶


From the immunoblot and skin test data, we conclude that the patient had IgE-mediated immediate-type allergy to Beluga caviar.

We emphasize that allergy even to uncommon food allergens must be thoroughly explored to prevent severe hypersensitivity reactions.

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 [return to article outline](#)

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